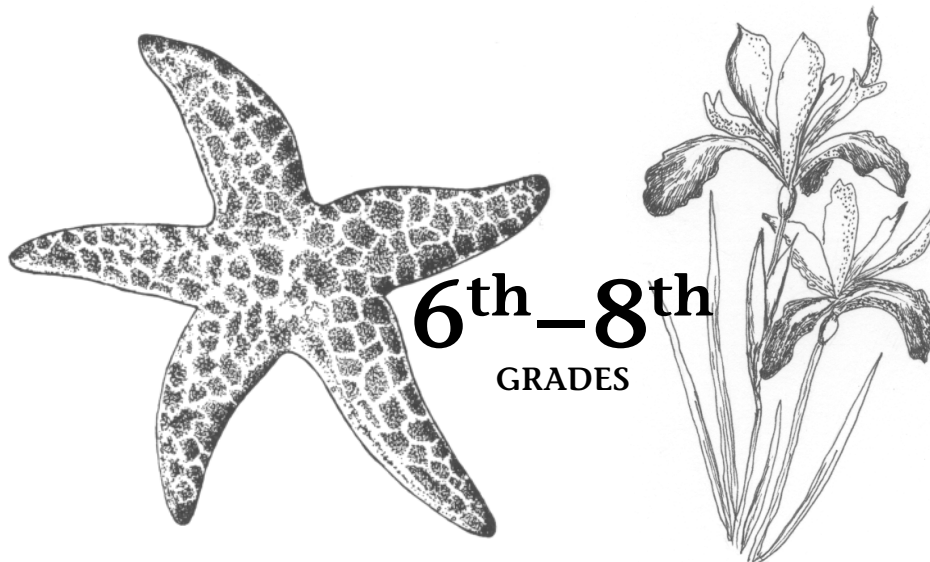


Creating  
**COASTAL  
STEWARDSHIP**  
*through Science*

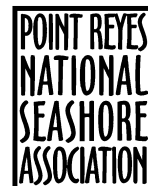
# Defining Habitats

*at Point Reyes National Seashore*

2000 First Edition



This project was made possible by funding from:



## Publishing Information

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This curriculum guide was funded with grants through the National Park Foundation.

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The listing of a resource in this curriculum does not presume its endorsement by the National Park Service.

This guide may be obtained by participating in a teacher workshop at Point Reyes National Seashore or through a teacher in-service training at your school.

Teachers are encouraged to offer their feedback by filling out the enclosed evaluation form or contacting Point Reyes National Seashore directly.



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# Preface

The intent of these guides is to provide middle school students with the opportunity to observe natural processes at Point Reyes National Seashore so they might take a greater interest in environmental stewardship and science. Teachers from fifteen area schools developed and field-tested seven “Creating Coastal Stewardship through Science” guides for classroom and field trip use. Each guide is carefully designed to facilitate a hands-on learning experience using science and the environment. Natural resources such as Pacific gray whales, northern elephant seals, tule elk, California quail, Douglas iris, and the San Andreas Fault are highlighted because they are easy to identify and to observe. All activities are linked to the California State Science Standards (2000) and the National Science Standards.

You may use this guide alone or in conjunction with other guides. We highly recommend that whenever you use a guide, you use the pre-visit activities to fully prepare the students for the field trip. These activities address student safety, wildlife observation techniques, equipment use, field journal development, and concepts that need to be taught prior to the park visit. Use of the post-visit activities is also critical to the learning process because they guide the students in making scientific deductions and in developing their environmental stewardship ethics.

Following this preface, you will find background information on the National Park Service and an overview of Point Reyes National Seashore. To provide your students with a better understanding of the place that they will be visiting, we recommend that you share this information with them. For an in-depth overview of the National Park Service, visit our website at **[www.nps.gov](http://www.nps.gov)**.

Point Reyes National Seashore provides outstanding opportunities for learning about natural and cultural resources. There are also exceptional educational opportunities provided by Park partners such as the Point Reyes Bird Observatory, Audubon Canyon Ranch, and Point Reyes National Seashore Association. To learn more about the Park and our partners, visit our website at **[www.nps.gov/pore](http://www.nps.gov/pore)**.





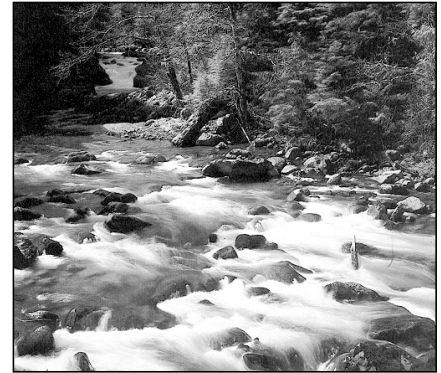
# THE NATIONAL PARK SERVICE

*The National Park Service cares for special places saved by the American people so that all may experience our heritage.*

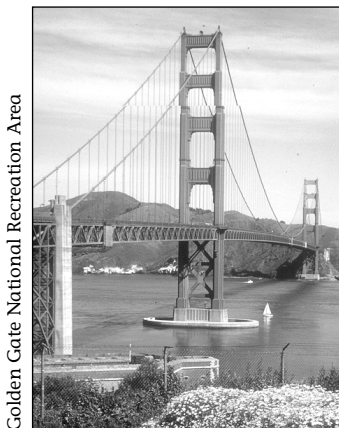
## Experience Your America

On August 25, 1916, President Woodrow Wilson signed the act creating the National Park Service, a new federal bureau in the Department of the Interior responsible for protecting the 40 national parks and monuments then in existence and those yet to be established.

This “Organic Act” of 1916 states that “the Service thus established shall promote and regulate the use of Federal areas known as national parks, monuments and reservations... by such means and measures as conform to the fundamental purpose of the said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”



Olympic National Park



Golden Gate National Recreation Area

The National Park Service still strives to meet these original goals, while filling many other roles as well: guardian of our diverse cultural and recreational resources; environmental advocate; world leader in the parks and preservation community; and pioneer in the drive to protect America’s open space.

The National Park System of the United States comprises over 379 areas covering more than 83 million acres in 49 states, the District of Columbia, American Samoa, Guam, Puerto Rico, Saipan, and the Virgin Islands.

Although not all parks are as well known as the Grand Canyon and Yellowstone, all are areas of such national significance that they have been included in the National Park Service—ancient ruins, battlefields, birthplaces, memorials, recreation areas, and countless other wonders. Point Reyes National Seashore is one of ten national seashores.



Mesa Verde National Park



Grand Canyon National Park

The future of the National Park System lies in understanding and protecting its meanings, values, and resources. Each part of the system represents the United States and a part of our heritage. Preservation of individual sites and the entire system will ensure the essence of quality remains in our lives and the lives of all future generations.





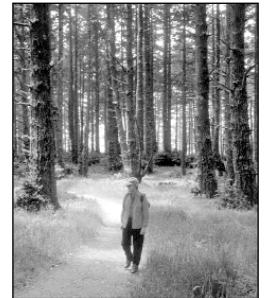
# POINT REYES NATIONAL SEASHORE



Bruce Farnsworth

*Point Reyes National Seashore was established to preserve and protect the natural and cultural features and natural ecosystems along the diminishing undeveloped coastline of the western United States. Located just an hour's drive from a densely populated metropolitan area, the Seashore is a sanctuary for countless plant and animal species. With half of Point Reyes National Seashore designated as wilderness, it provides a sanctuary for the human spirit—for discovery, inspiration, solitude, and recreation—and a reminder of the human connection to the land.*

Point Reyes National Seashore comprises over 71,000 acres, including 32,000 acres of wilderness area. Estuaries, windswept beaches, coastal scrub, coastal grasslands, salt marshes, and coniferous forests create a haven of 80 miles of unspoiled and undeveloped coastline located just an hour's drive from an urban area populated by seven million people. Abundant recreational opportunities include 140 miles of hiking trails, backcountry campgrounds, and numerous beaches.



Sue Van Der Wahl

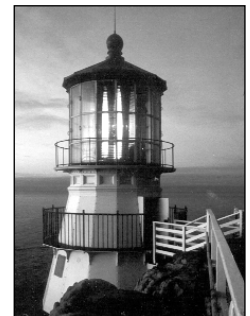
The San Andreas Fault separates the Point Reyes Peninsula from the rest of the North American continent. Granite bedrock found here and not found again until the Sierra Nevada range suggests the peninsula is geologically dynamic. According to geologists, the land that is now called Point Reyes has moved some 300 miles northwest over a period of 100 million years and is still moving.



Rich Stallcup

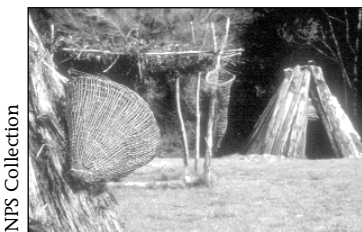
As wildland habitat is developed elsewhere in California, the relevance of Point Reyes as a protected area with a notably rich biological diversity increases. Over 45% of North American avian species and nearly 18% of California's plant species are found here. Point Reyes also contains some examples of the

world's major ecosystem types. For this reason, and because Point Reyes is dedicated to the conservation of nature and scientific research, it was recognized in 1988 by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) Man and the Biosphere program and named as part of the Central California Coast Biosphere Reserve.



Bruce Farnsworth

The cultural history of Point Reyes spans many lives and ways of living with the land. The Coast Miwok people are the first known residents of this peninsula. Archeologists have identified over 100 village sites in the Seashore and cultural traditions are still celebrated in the Park annually. Overlapping the Coast Miwok were Mexican land grantees, lighthouse keepers, and lifesaving station crews. To this day, agricultural operations that were built near the turn of the twentieth century continue within the Seashore's pastoral zone.



NPS Collection







## Educational Opportunities at POINT REYES NATIONAL SEASHORE

*Point Reyes National Seashore provides an outdoor classroom and learning laboratory for the study of geological and ecological processes and changing land-use values in which a greater understanding of and caring for public lands can be fostered.*

### **Ranger-led Curriculum-based Education Programs**

Reservations for Ranger-led programs are requested in writing and assigned on a first-come, first-served basis. Visit [www.nps.gov/pore](http://www.nps.gov/pore) for the reservation form and calendar.

**K-2**

Students explore the natural resources of the Seashore with Park Rangers in the Bear Valley area or in their classroom.



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**3-4**

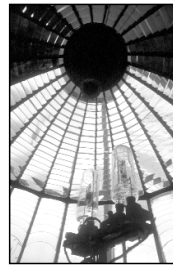
Students immerse themselves in the Coast Miwok culture by completing a comprehensive curriculum and visiting the Coast Miwok cultural exhibit, Kule Loklo.



NPS Collection

**4**

Students revisit the days of early lighthouse keepers while operating the original Point Reyes Lighthouse clockwork with Park Rangers.



NPS Collection

**5**

Students study the oceanic influences on the Point Reyes Peninsula by completing a classroom curriculum and viewing gray whales and elephant seals with Park Rangers.



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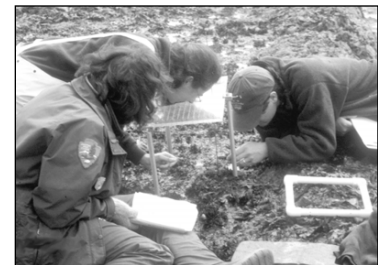
**6-8**

Students participate in Ranger-led stewardship activities such as habitat restoration, water quality monitoring, and beach cleanups.

### **Ranger-led Training Programs**

**9-12**

Students become DOCENTS to assist middle school teachers with classroom teaching and use of scientific research tools on Seashore field trips (service learning credits earned).



NPS Collection

Students become RESEARCH ASSISTANTS at the Pacific Coast Learning Center by participating in the inventorying and monitoring of Seashore resources.

**Teachers**

Teacher workshops are offered throughout the year for existing Park curricula and for field trip planning. Visit the Seashore's website at [www.nps.gov/pore](http://www.nps.gov/pore) for a calendar of workshops.



NPS Collection

## Classroom and Field Trip Curriculum

Based on the National and State Science and Social Science Standards

3-4



Teacher packets are available for field trips to the recreated Coast Miwok village, Kule Loklo, located near the Bear Valley Visitor Center.

**The “Creating Coastal Stewardship through Science” middle school curricula are available to teachers who attend a one-day workshop at Point Reyes or a teacher in-service training.**

6-8



Completion of the **Identifying Resident Birds** Curriculum, as a companion to a birdwatching field trip, will enable students to observe and identify different bird species, their habitats and their behaviors. A visit to Point Reyes Bird Observatory will also enable students to observe bird banding and netting and to understand the most common threats to bird survival.



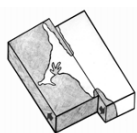
Completion of the **Monitoring Creek Health** Curriculum, as a companion to a Ranger-led creek program, will enable students to observe and understand the complexity and sensitivity of creek habitats and their role in protecting them.



Completion of the **Discovering Northern Elephant Seals** Curriculum, as a companion to an elephant seal viewing field trip, will enable students to observe and understand the amazing adaptations and behaviors of Northern elephant seals.



Completion of the **Defining Habitats** Curriculum, as a companion to a Park field trip, will enable students to observe and understand the complex land and ocean habitats of the Point Reyes Peninsula and their roles in habitat protection.



Completion of the **Uncovering the San Andreas Fault** Curriculum, as a companion to a geology field trip, will enable students to observe and understand the existence of the San Andreas Fault and the implications that it has for area residents.



Completion of the **Investigating Tule Elk** Curriculum, as a companion to an elk viewing field trip, will enable students to observe and understand their behaviors and the issues that surround their management.



Completion of the **Observing Pacific Gray Whales** Curriculum, as a companion to a whale watching field trip, will enable students to observe and understand gray whale adaptations and behaviors, and the factors that influence their survival.

## Educational Facilities



The **Historic Lifeboat Station** is available to educational groups for overnight use. Nightly fees are charged. Group size must be under 25 (including chaperones). Reservations are made on a first-come, first-served basis by completing the boathouse form on our website at [www.nps.gov/pore](http://www.nps.gov/pore).



The **Clem Miller Environmental Education Center** is an overnight facility available by lottery to school groups visiting for multiple-night stays September through mid-June. The facility is used for summer camps during the summer months. Fees are charged. For more information, contact Point Reyes National Seashore Association at (415) 663-1200 or [www.ptreyes.org](http://www.ptreyes.org)



The **Pacific Coast Learning Center** is a day-use facility located on Highway 1. This facility is used by researchers and students to study the natural and cultural resources of the Seashore.



The **Bear Valley Visitor Center** is a day-use facility open to school groups Monday through Friday from 9 A.M. to 5 P.M. Exhibits on natural and cultural resources are found here. Books, brochures, and other educational materials are available.



The **Ken Patrick Visitor Center** is located on Drakes Beach, approximately 30 minutes from the Bear Valley Visitor Center. This facility is open year-round on weekends and holidays from 10 A.M. until 5 P.M. Ranger-led elephant seal programs meet at this Visitor Center. Exhibits and a 150-gallon saltwater tank are located here. Books, brochures, and other educational materials are available.



The **Lighthouse Visitor Center** is located on the outermost tip of the Peninsula, approximately 45 minutes from the Bear Valley Visitor Center. This facility is open Thursday through Monday from 10 A.M. until 4:30 P.M. (closed Tuesdays and Wednesdays). Ranger-led whale programs and lighthouse tours meet at this Visitor Center. Exhibits on maritime history and whale biology are located here. Books, brochures, and other educational materials are available.



The **Lighthouse** is located below the Lighthouse Visitor Center at the bottom of a 308-step staircase. The lens room is usually open from 2:30 P.M. until 4 P.M. Thursday through Monday or as weather and staffing permit. High winds always close the lens room. Space in the lens room is limited so reservations are required for groups. Call (415) 669-1534 to confirm existing weather conditions.

### ***Group Camping/Overnight Opportunities***

\* This listing is provided for your convenience and does not constitute a recommendation or endorsement of any of these facilities.



All overnight camping in **Point Reyes National Seashore** requires a permit and advance reservations. Group sites are very limited and in high demand. Sky, Coast, and Wildcat Camps are all backcountry campgrounds that require hiking to access them. A fee is charged. For more information, visit the Seashore's website at ***www.nps.gov/pore***.

The **Point Reyes Hostel** offers a dormitory-style group cabin with a fully equipped kitchen and showers. For additional information and reservations, call (415) 663-8811 during office hours 7:30 to 9:30 A.M. and 4:30 to 9:30 P.M.

**Samuel P. Taylor State Park**, located 6 miles east of the Seashore on Sir Francis Drake Boulevard, offers campsites for groups. A fee is charged. Reservations are highly recommended. For more information, visit the reservations website at ***www.reserveamerica.com***.

**Olema Ranch Campground** is located half a mile from Seashore headquarters on Highway 1. It is privately owned. Several large group sites are available. Fees are charged. For more information, call (415) 663-8001.

The **Marconi Center** is located 8 miles north of Seashore headquarters on Highway 1. This facility is operated by California State Parks. Lodging, conference rooms, and catered meals are provided for a fee. For more information, call 1 (800) 970-6644 or visit the website at ***www.marconiconfctr.org***.





National Park  
FOUNDATION

# Creating COASTAL STEWARDSHIP *through Science*



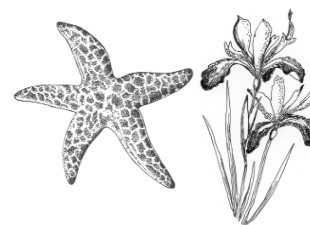
## Defining Habitats

Teacher Preparation .....	3
Pre-Visit Activities .....	43
On-Site Activities .....	87
Post-Visit Activities .....	125
Resources .....	155





# Creating **COASTAL STEWARDSHIP** *through Science*



## Defining Habitats

### Teacher Preparation

Introduction . . . . .	3
Considerations . . . . .	3
Chaperone Preparedness and Assistance . . . . .	4
Suggested Lesson Plan . . . . .	5
Field Trip Logistics . . . . .	6
Evaluation Process . . . . .	9
Reservations . . . . .	9
Habitat Backpack Contents . . . . .	9
California Science Standard Links . . . . .	10
Correlations to “A Child’s Place in the Environment”	11
Acknowledgments . . . . .	12

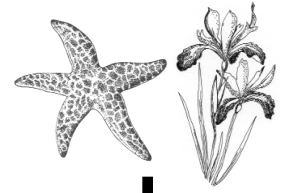
### Attachments:

Maps . . . . .	13
Lyme Disease, Stinging Nettle, and Poison Oak . . . .	17
Reservation Form . . . . .	19
Evaluation Form . . . . .	21
Vocabulary . . . . .	23





# Defining Habitats



## Teacher Preparation

**P**OINT REYES NATIONAL SEASHORE contains an amazing variety of ocean and land habitats. From the mixed woodlands of the Olema Valley to the sandy beaches along the ocean's edge, these habitats support a seemingly endless diversity of life. As your students experience these habitats they will have an opportunity to discover the value of this seashore in their lives.

### Considerations

**When:** May be used year-round. The tidepool habitat is best visited in the winter during a midday minus tide.

**Where:**

- **Bear Valley Trail** for Douglas fir woodland and riparian habitat
- **Coast Trail** for coastal scrub and riparian habitat (and potentially sandy beach)
- **Limantour Beach** for coastal scrub, sandy beach and estuary habitats
- **Bayview Trail** to Muddy Hollow for bishop pine forest, coastal scrub, and riparian habitats
- **Duxbury Reef or Sculptured Beach** for tidepooling

**How:**



This symbol marks an activity that should only be used for land habitat studies.



This symbol marks an activity that should only be used for ocean habitat studies.



When combined, this symbol marks an activity that may be used for both land and ocean habitat studies.

This unit may be used independently of all other units. If you want to use an additional unit during your visit, we suggest using "Uncovering the San Andreas Fault", "Identifying Resident Birds", or "Monitoring Creek Health".

Creating  
**COASTAL**  
**STEWARDSHIP**  
through Science



**Weather:** The chart below lists average climate expectations based on previous year's data. The weather is subject to change quickly and can vary dramatically from different locations within the Seashore on the same day.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Temperature (Fahrenheit)												
Normal Daily Maximum	53	55	55	57	60	62	64	64	65	62	58	54
Normal Daily Minimum	41	42	42	43	47	50	51	52	51	48	45	42
Extreme High	78	85	80	92	94	99	96	96	103	96	81	79
Extreme Low	21	26	29	32	32	39	39	42	39	32	29	18
Precipitation (inches)												
Normal	12.0	9.0	8.0	4.0	3.0	1.0	0.3	0.8	2.0	4.0	9.0	12.0
Maximum	20.0	16.0	15.0	11.5	8.0	4.0	2.5	6.0	7.0	13.0	18.0	19.0

**Seasonal Events:** Consult the chart below to assess which months may be best for a class visit to Point Reyes National Seashore.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Gray Whale Migration	✓		✓	✓								
Elephant Seal Breeding	✓	✓	✓									
Bird Migration			✓	✓	✓				✓	✓	✓	✓
Coho Spawning	✓											✓
Steelhead Trout Spawning		✓										✓
Tule Elk Rut Season							✓	✓	✓			
Peak Flower Blooms			✓	✓	✓							
Tidepooling	✓	✓	✓									
Geology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ocean and Land Habitats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resident Birds	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

## Chaperone Preparedness and Assistance

The success of your field trip will depend on your ability to actively prepare and involve your parent chaperones in the field trip activities. Without adult guidance, many of the students will not complete their field journals. It is essential that your field trip have as much structure as your classroom lessons.

- Assign each of your parents to a small group of students.
- Inform each parent of their responsibilities for assisting their students with field observations and with journal questions.
- Provide each chaperone with their own copy of the student journals and encourage them to complete it with the students.

## Suggested Lesson Plan



# Teacher Preparation

PRE-VISIT		Time Needed: 5 hours
Activity #1	How Do We Identify the Plants and Animals of Point Reyes National Seashore? <i>Students become familiar with observation techniques for wildlife and plant species.</i>	1 .5 hrs
Activity #2	What Flora and Fauna Can We Expect to See On Our Field Trip? <i>Students assume the roles of botanists and biologists to gain familiarity with field guides and other research sources.</i>	2 hours
Activity #3	How Can We Prepare for Our Visit to Point Reyes National Seashore? <i>Students prepare for field trip by reviewing expectations and creating field journals.</i>	1 hours
Activity #4	Safety and Stewardship Challenge <i>Proper behaviors around National Park resources are examined in a game format.</i>	30 min
Activity #5	How Do I Use Binoculars?	varies
ON-SITE		Time Needed: 3 hours
Field Journal	How Can We Understand the Habitats of Point Reyes National Seashore? <i>Students complete their field journals by using the Bear Valley Visitor Center exhibits and field observations.</i>	3 hours
Optional Onsite	What Can We Do to Restore Habitats Within Our Ecosystem? <i>Teachers should consider a Habitat Restoration or Beach Clean Up stewardship activity to follow-up their field visit.</i>	varies
POST-VISIT		Time Needed: 2 hours
Activity #1	What Can We Learn From Our Field Journals? <i>Students compile data from their field journals to draw conclusions between what they have previously learned in class and what they experienced in the field.</i>	2 hours
Activity #2	How Can I Choose and Complete the Best Stewardship Project for me? <i>Students develop action plans to complete a project that will benefit habitats and their environment.</i>	time varies





## Field Trip Logistics

# Teacher Preparation

<i>Students need:</i>	<i>Teachers need:</i>	<i>Chaperones need:</i>
<input type="checkbox"/> rain gear	<input type="checkbox"/> rain gear	<input type="checkbox"/> rain gear
<input type="checkbox"/> warm, layered clothes	<input type="checkbox"/> warm, layered clothes	<input type="checkbox"/> warm, layered clothes
<input type="checkbox"/> gloves and hat	<input type="checkbox"/> gloves and hat	<input type="checkbox"/> gloves and hat
<input type="checkbox"/> sunscreen and sunglasses	<input type="checkbox"/> sunscreen and sunglasses	<input type="checkbox"/> sunscreen and sunglasses
<input type="checkbox"/> bag lunch with drink	<input type="checkbox"/> bag lunch with drink	<input type="checkbox"/> bag lunch with drink
<input type="checkbox"/> water	<input type="checkbox"/> water	<input type="checkbox"/> water
<input type="checkbox"/> waterproof boots or tennis shoes	<input type="checkbox"/> waterproof boots or tennis shoes	<input type="checkbox"/> waterproof boots or tennis shoes
<input type="checkbox"/> clipboard with field journal and pencil	<input type="checkbox"/> map with directions	<input type="checkbox"/> map with directions
<input type="checkbox"/> permission slip	<input type="checkbox"/> pencil sharpeners and extra pencils	
	<input type="checkbox"/> teacher backpack and field trip kits from Bear Valley Visitor Center	
	<input type="checkbox"/> first aid kit	
<b>Optional:</b>		
<input type="checkbox"/> small backpack	<input type="checkbox"/> small backpack	<input type="checkbox"/> small backpack
<input type="checkbox"/> binoculars	<input type="checkbox"/> binoculars	<input type="checkbox"/> binoculars
	<input type="checkbox"/> camcorder/camera	<input type="checkbox"/> camcorder/camera

### Other Things to Remember:

- Have students bring a bag lunch since you will be visiting during lunch time.
- If you have a student with accessibility concerns, please call the Park for suggestions.
- Students need warm, waterproof clothing most of the year. Sunscreen is needed on most days. Students should always be prepared for all types of weather.
- Have the students wear long pants and closed-toe shoes, preferably tennis shoes.
- Binoculars will assist the students in viewing the wildlife. These may be checked out from the Bear Valley Visitor Center. If you plan to use this equipment, it is essential that you train the students to use binoculars before their visit. See the enclosed binocular activity.



### ***Bear Valley Trail: Douglas fir woodland/riparian habitat***

- Bathrooms are located in the Earthquake Trail parking lot and in the Bear Valley Visitor Center. Trash cans for lunch waste are also located here.
- Travel time from Point Reyes Station to the Bear Valley Visitor Center is about 15 minutes. Most groups visit the Bear Valley Area between 10 A.M. and 1 P.M. If you plan to visit during this time, have students bring a bag lunch. A picnic area with tables and trash cans is located across from the Bear Valley Visitor Center. Following lunch, have them check the area for trash.
- The beginning portion of the Bear Valley Trail is accessible to wheelchairs.

### ***Coast Trail: coastal scrub/riparian habitat/sandy beach***

- Coast Trail is NOT directly accessible to buses. The bus parking lot for the Education Center (located on the Limantour Beach road before the Ed Center turnoff) may be used for access. After parking in this lot, students will walk to Coast Trail using the trail to the Education Center (approximately 10 minutes). We suggest that you plan carpools for this hike to avoid the logistics of parking the bus.
- Bathrooms are not available near Coast Trail unless you are staying overnight at the Clem Miller Education Center or the Hostel. The closest bathrooms are located in the Limantour Beach parking lot or at the Bear Valley Visitor Center.
- Travel time from Point Reyes Station to Coast Trail is about 20 minutes. Most groups use this trail between 10 A.M. and 1 P.M. If you plan to visit during this time, have students bring a bag lunch. No picnic area is located on this trail. However, Limantour Beach has a large parking lot (or area) and easy access to the beach for lunch. Following lunch, have them check the area for trash.
- Drinking water is not available on Coast Trail. Have the students bring their own drinking water.
- Most of Coast Trail is accessible to wheelchairs but the trail leading down from the bus parking lot is not. Parking for private vehicles is available near the trail.

### ***Limantour Beach: coastal scrub/estuary/sandy beach habitat***

- Bathrooms (no running water) are available near the Limantour Beach main parking lot.
- Travel time from Point Reyes Station to Limantour Beach is about 25 minutes. Most groups use this beach between 10 A.M. and 1 P.M. If you plan to visit during this time, have students bring a bag lunch. No picnic area is located on the beach but there are many open areas in which to sit. Following lunch, have them check the area for trash.
- Limantour Beach is accessible to wheelchairs via a paved trail to the dune area. Special wheelchairs are needed to travel on the sand. A special beach wheelchair is available for checkout (first-come, first-served) from the Point Reyes National Seashore Association at (415) 663-1200.





## ***Bayview Trail to Muddy Hollow: Bishop pine forest/coastal scrub/riparian habitat***

- Bayview trailhead is directly accessible to buses. A combination of trails may be hiked to create a loop or students may hike down and up the Bayview Trail. For a one-way hike from Bayview to Muddy Hollow, we recommend carpooling so that all drivers may drop the students at Bayview, then meet the group at Muddy Hollow. The Muddy Hollow road is not accessible to buses. Consult a Park trail map for more hiking information.
- Bathrooms are not available near Bayview trailhead. The closest bathrooms are located in the Limantour Beach parking lot or at the Bear Valley Visitor Center.
- Travel time from the Bear Valley Visitor Center to Bayview trailhead is about 15 minutes. Most groups use this trail between 10 A.M. and 1 P.M. If you plan to visit during this time, have students bring a bag lunch. No picnic area is located on this trail. However, the Bayview trailhead has a large parking lot. Following lunch, have them check the area for trash.
- Drinking water is not available at the Bayview trailhead. Have the students bring their own drinking water.
- Bayview trail is not accessible to wheelchairs.

## ***Duxbury Reef or Sculptured Beach: tidepool habitat***

***Tide pool creatures are extremely sensitive to humans. Trampling and careless handling kill thousands of tidepool creatures every year. Please respect this resource.***

- The easiest tidepools to visit are located at Duxbury Reef, south on Highway 1 outside of Point Reyes National Seashore. Driving time from Bear Valley Visitor Center is approximately 30 minutes.
- In Point Reyes National Seashore, Sculptured Beach may be accessed using Laguna or Coast Trails, or by walking along Limantour Beach (minus tide only). Due to the isolated location, hiking and tidepooling at Sculptured Beach takes 4 to 6 hours. This is only recommended for groups staying overnight at the Clem Miller Education Center, Youth Hostel, or at Coast Camp.
- Read the tide chart for the day you plan to visit. Tidepools are only visible during minus tides and are UNSAFE during moderate or high tides.
- Pit toilets (no running water) are located in the Duxbury Reef and Limantour Beach parking lots. Trash cans for lunch waste are also located here.
- Tidepooling is best during the winter due to the midday minus tides. This is the rainy and windy season. Students need warm, waterproof clothing and high, waterproof boots. Sunscreen is needed on most days.
- Ticks are abundant along the trails accessing Sculptured Beach. Staying out of scrub and on designated trails will minimize contact with ticks. See attached brochure for more information.
- Travel time from Point Reyes Station to the Limantour Beach parking lot is 25 minutes.
- Sculptured Beach is not accessible to wheelchairs, and people with a fear of heights may have difficulty descending the stairs leading to Sculptured Beach.



## Evaluation Process

We need your help! Since this guide was designed for your use, only your feedback will make it better. Following the unit overview is a preaddressed evaluation form. Please complete, fold in thirds, affix postage, and drop in the mailbox. In addition to the evaluation forms, we encourage other types of feedback. Please send any of the following items from your students:

1. Videotape or photos of Park field trip
2. Completed student journals
3. Any completed stewardship activities, including posters or newsletters
4. A class portfolio illustrating lesson activities
5. Any completed classroom projects or photographs of projects
6. Other items illustrating student feedback

Please indicate if these items need to be returned. We will use them to create a project library, highlight classroom efforts on our website and in Park publications, and complete evaluations of student outcomes.

Send to:      National Park Service  
                 Point Reyes National Seashore  
                 Division of Interpretation  
                 attn: Education Specialist  
                 Point Reyes Station, CA 94956

## Reservations

Please use the reservation form provided in this unit to contact the Seashore about your plans to do a self-guided, curriculum-based field trip to Point Reyes National Seashore.

## Habitat Backpack Contents

Habitat backpacks are available for check out at the Bear Valley Visitor Center. Clem Miller Education Center users may check them out at the Ed Center. These are available on a first-come, first-serve basis.

15 pairs of binoculars (for student use)  
Various field guides (birds, plants, mammals)  
Species identification cards  
First aid kit  
Magnification lenses  
Thermometers



## California Science Standard Links

# Teacher Preparation

	"Defining Habitats" Unit							
	Pre-Visit					On-Site	Post-Visit	
	#1	#2	#3	#4	#5	Field Journal	#1	#2
Sixth Grade								
1								
2						a,b,c,d	a,b,c,d	
3								
4						e	e	
5	a,b,c,d	a,b,c,d,e				a,b,c,e	a,b,c,d,e	
6								
7	b	b,d	b		b	b,c,e,f,h	a,b,c,d,e,f	
Seventh Grade								
1								
2								
3								
4								
5						a		
6					b,d			
7	a	a,b,e	a		a	a,d	a,b,c,d,e	
Eighth Grade								
1								
2								
3								
4								
5								
6								
7								
8								
9			a			a,b	a,b	



# Correlations to "A Child's Place in the Environment"

## California's State Approved Environmental Education Curriculum



# Teacher Preparation

	"Defining Habitats" Unit							
	PRE-VISIT					ON-SITE	POST-VISIT	
	#1	#2	#3	#4	#5	Field Journal	#1	#2
A Child's Place in the Environment: Grade 6 Lessons								
What Are Some Components of an Ecosystem?		✓				✓	✓	✓
What Role Does Diversity Play in an Ecosystem?	✓	✓				✓	✓	✓
How Does the Sun's Energy Flow Through an Ecosystem?							✓	
What Interrelationships and Niches Can Be Identified in an Ecosystem?		✓				✓	✓	
What Cycles Exist in an Ecosystem and How Do They Sustain an Ecosystem?						✓		
What Examples of Ecological Principles Can Be Observed in an Ecosystem?		✓				✓	✓	✓
What Are the Components and Relationships of Human Communities and How Do They Compare to Ecosystems?		✓					✓	
What Are Some Limiting Factors in Human Communities and in Ecosystems?		✓						✓
How Do Energy Sources Used in Human Communities Compare to Those Used in Ecosystems?								
How Can Organic Solid Waste in Human Communities Be Composted?								
How is Land Used by Our Community and How Are Land-Use Decisions Made?								
How Can the Disposal of Solid Waste Affect the Quality of the Environment?								
How Does the Motor Vehicle Transportation System Affect the Environment?								
How Do Human Beings Affect Watersheds?					✓		✓	✓
What Human Actions Enhance, Protect, and Sustain the Quality of the Environment?			✓		✓			✓
What Have Communities Done to Become More Sustainable?								
What Projects Can Students Implement to Make Their Classroom and School or Community More Sustainable?								✓



## Acknowledgments

This unit was written by area teachers, Park Rangers, scientists, and area naturalists. Special thanks to the following people:

### **Workshop Participants**

Jules Evens, Naturalist  
Joe Mueller, Marine Biologist, College of Marin  
Trudie Behr-Scott, Hill Middle School, Novato  
Trish Corsetti, Tomales School, Tomales  
Wilma Zari, Downer Middle School, San Pablo  
Scott Buchanan, St. Rita's School, Fairfax  
Mike Schulist, Miller Creek School, San Rafael  
Ted Stoeckley, Hall Middle School, Larkspur  
Trish Mihalek, Hall Middle School, Larkspur  
Sue McCullough, West Marin School, Point Reyes Station  
Patty Blanton, Lagunitas School, Lagunitas  
Sally Hutchinson, Lagunitas School, Lagunitas  
Teresa Peacock, Buena Vista Middle School, San Francisco  
Art Nelson, Lagunitas School, Lagunitas  
Marcia Phipps, Lagunitas School, Lagunitas  
Sandy Mallouf, White Hill Middle School, Fairfax

### **Point Reyes National Seashore: Division of Interpretation**

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Justine Rosenthal	Steve Anastasia
Daisy Martin	Kim Linse
Beth Brindle	Lynne Dominy
Heidi Strickfaden	Tom Parsons
Christie Denzel Anastasia	

### **Unit Evaluation**

Alan Gere	Sylvia Terry
Mary Barton	Trudie Behr-Scott
Division of Interpretation	Teresa Peacock

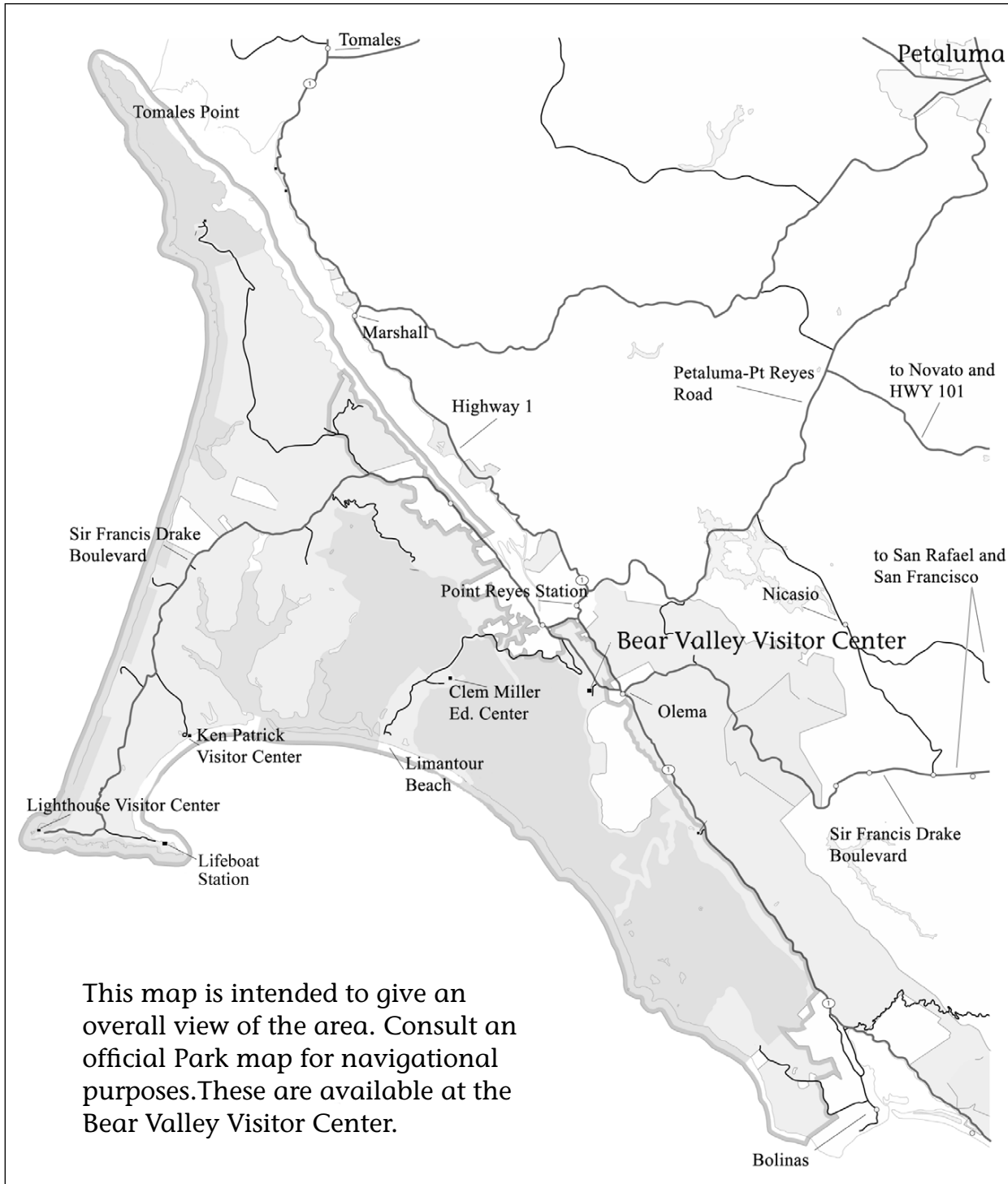
### **Unit Design**

Myrna Vladic Mayse, Bad Dog Graphics, San Anselmo  
Lynne Dominy  
Christie Denzel Anastasia  
Steve Anastasia

# Point Reyes National Seashore



## Attachment

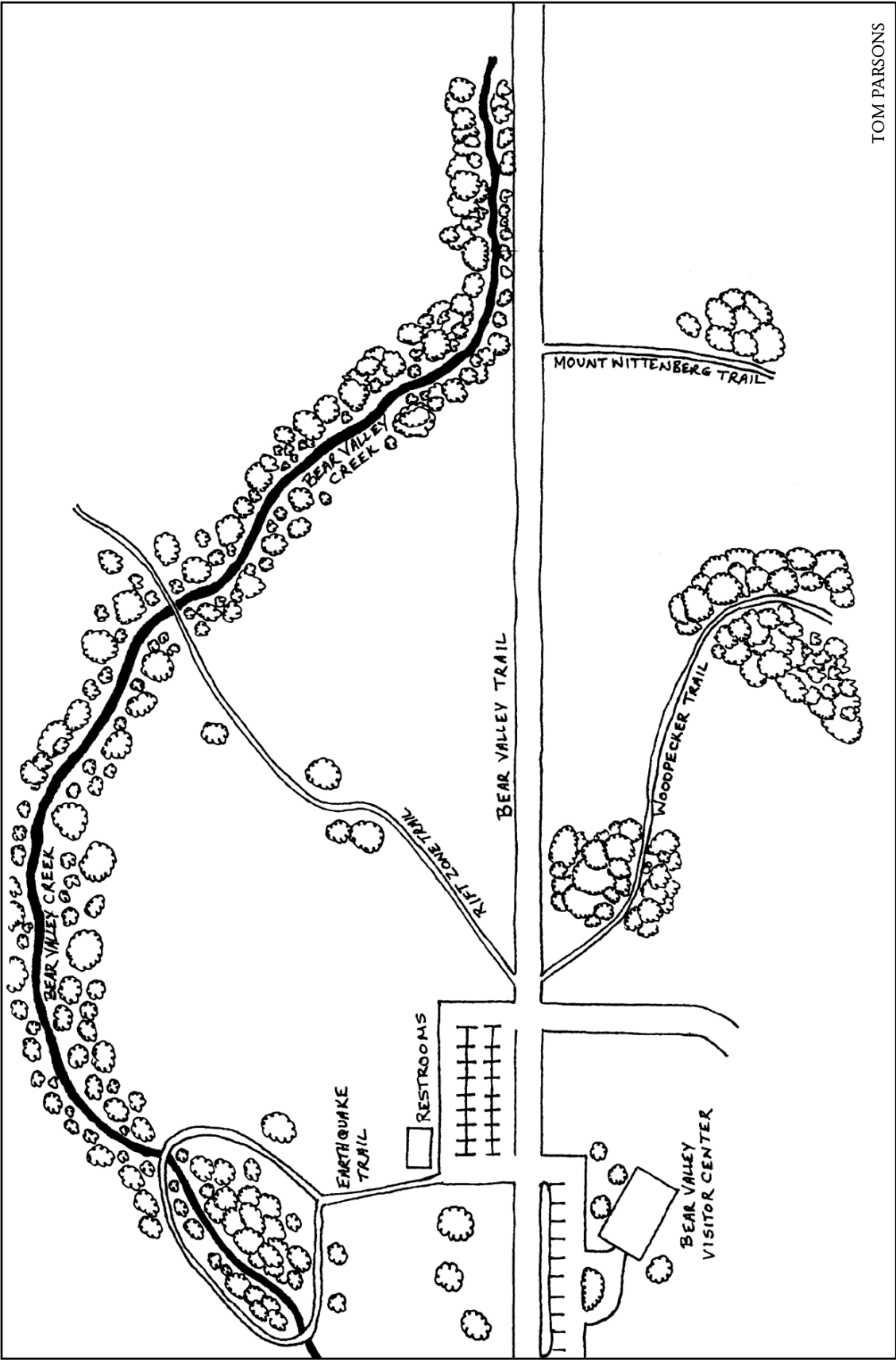


### Approximate Driving Times/Distances

Petaluma to Bear Valley VC	40 min./19 miles
Novato to Bear Valley VC	40 min./19 miles
San Anselmo to Bear Valley VC	30 min./20 miles
Bear Valley VC to Limantour Beach	20 min./9 miles
Bear Valley VC to Tomales Point	30 min./19 miles
Bear Valley VC to Ken Patrick VC	30 min./15 miles
Bear Valley VC to Lighthouse VC	45 min./22 miles



# Bear Valley Trail Site Map

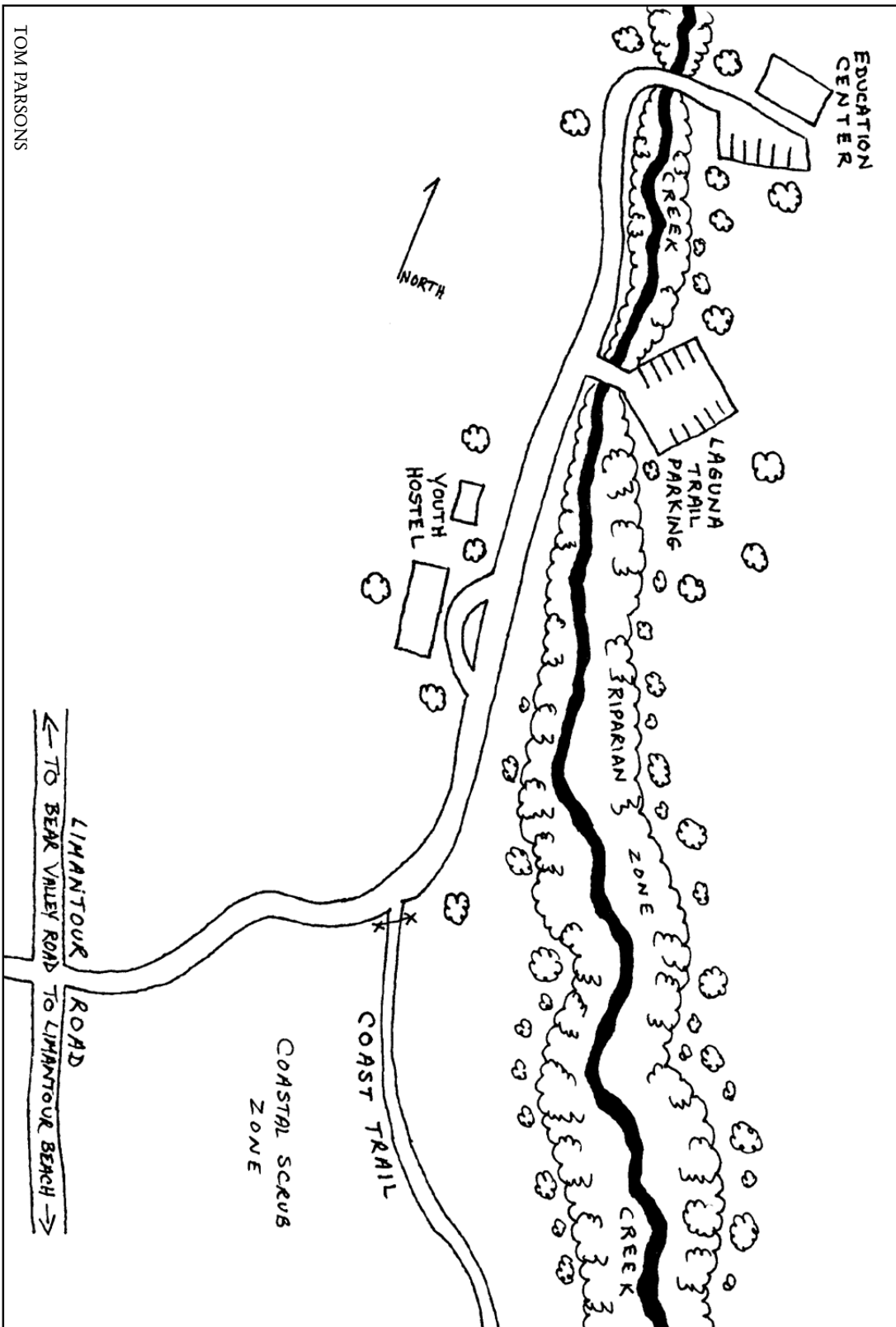


TOM PARSONS



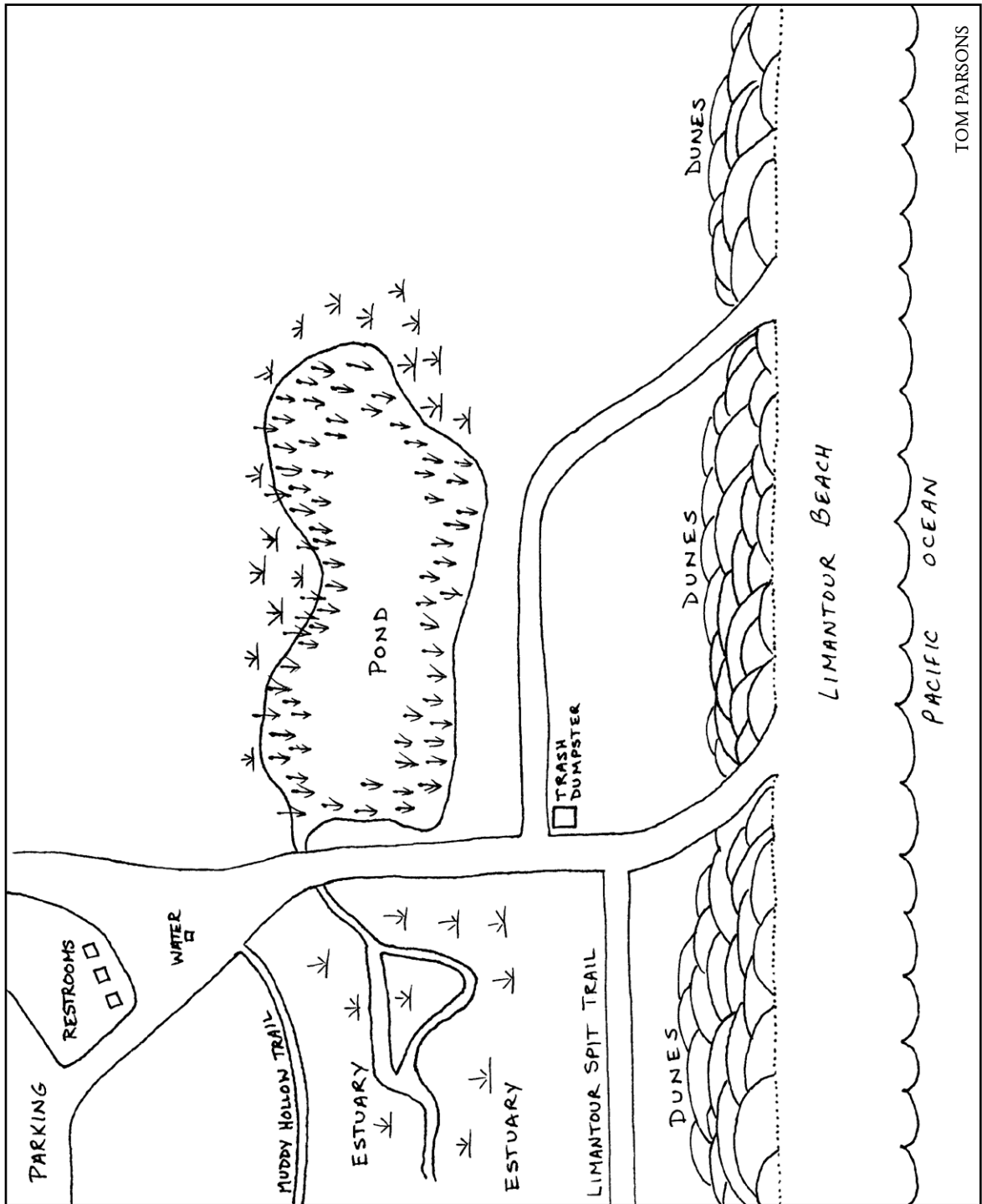
# Coast Trail/Ed Center Site Map

## Attachment





# Limantour Beach Site Map



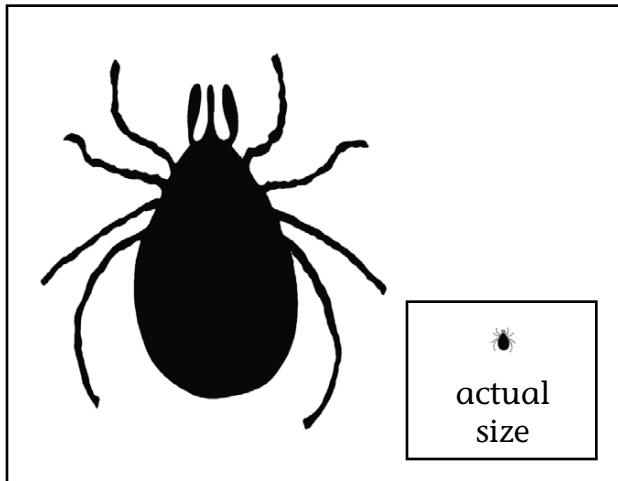
TOM PARSONS

# Lyme Disease, Stinging Nettle, and Poison Oak



## Attachment

**Lyme disease** is an illness caused by bacteria transmitted to people by tick bites. Not all ticks carry the disease. Field studies in Marin County show that 1–2% of the western black-legged ticks carry Lyme disease. Since there are several other species of ticks in Marin, the odds of a tick bite producing Lyme disease are less than 1 in 100. Even so, Lyme disease can be severe; it is important to understand the prevention and symptoms.



### Symptoms:

arthritis and joint pain  
lethargy  
heart problems  
pain/limping  
fever  
kidney problems  
depression  
bull's-eye rash (50% of victims)

### Tick species in California include:

Western black-legged tick and Pacific coast tick (West Coast)  
Lone star tick and American dog tick (throughout U.S.)

### How to avoid tick bites:

- Wear light-colored, long-sleeved clothes so you can more easily see the ticks.
- Tuck shirt into pants and pants into socks to keep ticks away from your skin.
- Stay on trails.
- Apply an insect repellent, labeled for ticks, to shoes, socks, and pants.
- Check yourself completely after a hike. Closely check any skin irritation. Ticks anesthetize the skin before biting so you'll seldom feel the original bite.

### What to do if bitten:

- Use tweezers to grasp tick at point of attachment, as close to skin as possible. Gently pull tick straight out.
- Save tick, notify your doctor.
- Don't panic—ticks need to be embedded for 24–48 hours to transmit bacteria. The ticks that transmit Lyme disease are usually in a developmental phase in which they are smaller than the head of a pin.

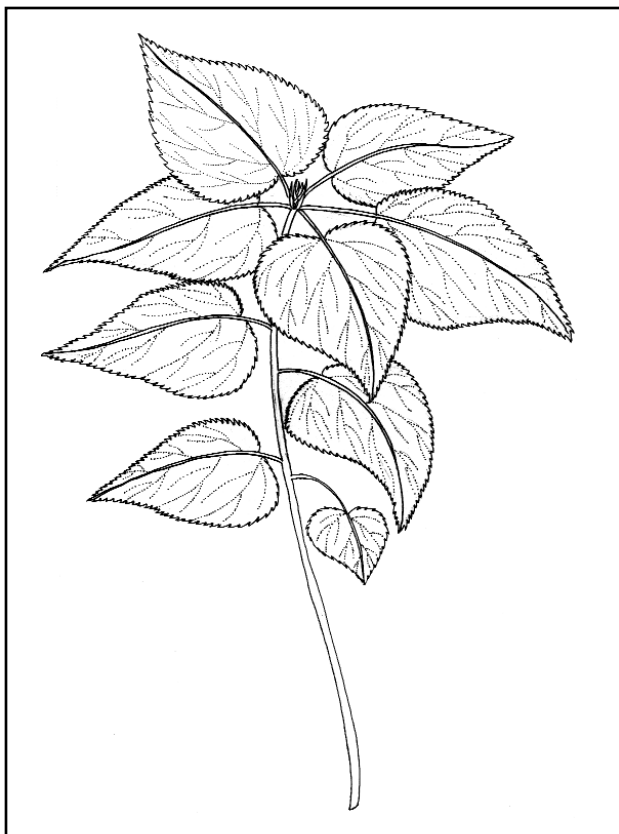
### References:

Ticks and Lyme Disease in the National Parks (brochure)  
Lyme Disease Foundation at [www.lyme.org](http://www.lyme.org)



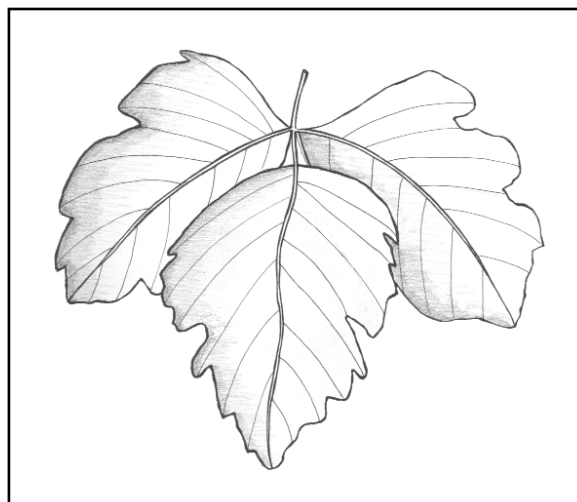
## Lyme Disease, Stinging Nettle, and Poison Oak (continued)

### Attachment



**Stinging nettle** is native to Europe, but grows at Point Reyes National Seashore. It can cause a painful rash that stings for up to twelve hours after brushing up against the plant. A topical analgesic (used to treat poison ivy or bug bites) can be applied to help alleviate the sting. Study the picture and have someone point out the plant in the Seashore to aid in its identification.

**Poison oak** usually causes an itchy rash if you are sensitive to it. You can get a rash by touching the plant, its leaves or roots. You can also contract poison oak by petting your dog (if the oils are on its coat) or by touching clothing that has touched poison oak. Rashes may occur several days after the initial contact with the plant. Severe rashes may affect the lungs. If you have difficulty breathing, call 911 or go to the nearest emergency room immediately. Preventive topical ointments are available to help avoid reactions to poison oak. Learn to recognize the compound leaves with a shiny appearance.





# Creating Coastal Stewardship through Science



## Reservation Form

If you are planning a trip to Point Reyes National Seashore to use this curriculum, please notify the Park to avoid conflicts with other groups and to be notified about any unusual closures. Mail this form at least two weeks in advance (fold in thirds and affix postage) or call (415) 464-5139 to leave a message.

Teacher Name: \_\_\_\_\_

School Name: \_\_\_\_\_

School Address: \_\_\_\_\_

City/State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

School Phone: \_\_\_\_\_ School Fax: \_\_\_\_\_

Email Address: \_\_\_\_\_

Grade: \_\_\_\_\_ Class Size: \_\_\_\_\_

Home Phone: \_\_\_\_\_

### Field Trip Options

Monitoring Creek Health

Observing Pacific Gray Whales

Discovering Northern Elephant Seals

Defining Habitats

Investigating Tule Elk

Uncovering the San Andreas Fault

Identifying Resident Birds

### Field Trip Preferences

Field Trip Topic	Dates (list three in order of preference)	Time
1. _____	_____ _____ _____	_____ _____ _____
2. _____	_____ _____ _____	_____ _____ _____

-----  
Comments

\_\_\_\_\_ Confirmation Letter

\_\_\_\_\_ Materials Sent

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National Park Service  
Point Reyes National Seashore  
Division of Interpretation  
attn: Education Program Coordinator  
Point Reyes Station, California 94956

# Creating Coastal Stewardship through Science



## Evaluation Form

Please help us develop and improve our programs by taking a few minutes to complete this form. This evaluation form is preaddressed, but needs to be folded in thirds and provided with postage. If you prefer, email comments to:

***PORE\_Education@nps.gov***

Name: \_\_\_\_\_ School Name: \_\_\_\_\_

School Address: \_\_\_\_\_

City/State/Zip Code: \_\_\_\_\_

School Phone: \_\_\_\_\_ School Fax: \_\_\_\_\_

Email Address: \_\_\_\_\_

Class Size/Grade: \_\_\_\_\_

Date of Visit: \_\_\_\_\_ Program/Location: \_\_\_\_\_

### ***Getting Your Visit Set Up***

Do you have any suggestions to make logistics easier? (maps, directions, reserving programs)

### ***Curriculum Materials***

Which lessons were the most effective?

Relevance of content to my students and curriculum:

Grade appropriateness?

### ***Program Assessment***

How does this program fit into California/National Standards and your personal education program?

Strengths/weaknesses of program?

Best part of experience?

What is the level of support at your school for this program?

What could the National Park Service do to improve your education program?

Overall, how would you respond if a colleague asked about this program?

Highly recommended   Recommended   Recommended with some qualifications  
Not recommended

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National Park Service  
Point Reyes National Seashore  
Division of Interpretation  
attn: Education Specialist  
Point Reyes Station, California 94956





## Land Definitions

<b>Adaptations</b>	an organism's adjustment to environmental conditions that makes it more fit for survival
<b>Aggregation</b>	a crowd or dense cluster, usually used to describe groups of animals
<b>Amphipod</b>	any of numerous small, flat-bodied crustaceans of the group Amphipoda, including the beach fleas, sand hoppers, etc.
<b>Animal sign</b>	evidence of an animal's presence including scat, rubbings, tracks and trails
<b>Annual precipitation</b>	the amount of rain, snow, hail, etc., that falls at a given place within a one-year period, usually expressed in inches or centimeters of water
<b>Anthrax</b>	deadly bacteria that thrive in decaying cattle and sheep and usually causing the slow, agonizing death of any warm-blooded animal that gets infected
<b>Array</b>	a collection device to collect small mammals and amphibians
<b>Artifact</b>	an item of historical or archeological significance
<b>Bacteria</b>	plural of bacterium, any of a class of single-celled organisms, spherical, spiral or rod-shaped, and appearing singly or in chains, various species of which are involved in fermentation, putrefaction, infectious diseases, or nitrogen fixation
<b>Biological diversity or biodiversity</b>	the number of species in a given habitat
<b>Biologist</b>	a scientist who studies the science of life or living matter in all its forms and phenomena, especially with reference to origin, growth, reproduction, structure, and behavior
<b>Biotic community</b>	an association of living organisms having mutual relationships among themselves and to their environment and thus functioning, at least to some degree, as an ecological unit
<b>Bird</b>	any warm-blooded vertebrate having a body covered with feathers, forelimbs modified into wings, scaly legs, a beak, no teeth and bearing its young in a hard-shelled egg
<b>Botanist</b>	a scientist who studies the science of plants, the branch of biology that deals with plant life
<b>Bryozoan</b>	an aquatic invertebrate animal that forms colonies; also called moss animals



# Vocabulary

<b>Bud arrangement</b>	a description derived from the way a plant grows; buds may be opposite each other, alternating, or coiled in a stem
<b>Camouflage</b>	an organism's physical appearance which blends into its environment
<b>Carnivore</b>	term commonly applied to any animal whose diet consists wholly or largely of animal matter
<b>Carrying capacity</b>	maximum population of a species that can be sustained in a habitat over the long term; usually refers to a particular species, but can be applied to more than one
<b>Coastal scrub community</b>	a plant and animal community characterized by low, drought-resistant shrubs and grasses
<b>Commensal relationship</b>	two or more kinds of organisms living close association, in which one may derive some benefit, but neither harms the other
<b>Community</b>	an association of living organisms having mutual relationships among themselves and to their environment and thus functioning, at least to some degree, as an ecological unit
<b>Competition</b>	members of the same or different species, living in the same environment, that have the same food or space requirements and that must compete for survival
<b>Coniferous (plant)</b>	retaining its leaves at the end of the growing season and usually remaining green through the winter
<b>Consumer</b>	an organism that relies on other plants or animals for food
<b>Critical habitat</b>	a specific area of land occupied by an endangered species
<b>Crown</b>	the overhead layers of vegetation, such as the canopy formed by the upper branches of trees in a forest
<b>Cryptically colored</b>	having a shell or skin that blends in with the environment and therefore protects an animal from being seen by a predator
<b>Deciduous</b>	having leaves that shed or fall off its leaves each year; the opposite of evergreen
<b>Decomposers</b>	nature's recycler; an organism, usually a bacterium or fungus, that breaks down the cells of dead plants and animals into simpler substances
<b>Density</b>	the number of organisms or items per unit area or volume
<b>Detritus</b>	organic material formed from decomposing organisms
<b>Distribution</b>	the arrangement or of a species in a given habitat





<b>Disturbed area</b>	an area where an ecosystem has been significantly altered
<b>Diversity</b>	the array of species present and their spatial distribution (i.e., biodiversity)
<b>Dominant plant</b>	the most abundant plant that one may see in a given habitat; for example, in the riparian thickets of Point Reyes National Seashore, the dominant plants are yellow willows and red alders
<b>Ecological web</b>	the interrelated web of plants, animals, fungi, and microbes
<b>Ecosystem</b>	a system formed by the interaction of dynamic and interrelating complex plant and animal communities of organisms with their non-living environment
<b>Endangered species</b>	any species in danger of extinction throughout all or a significant portion of its range
<b>Environment</b>	the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time
<b>Environmental factors</b>	the combined influence of wind, rainfall, temperature, and exposure
<b>Erosion</b>	the loss of soil or rock through wind, rain, or wave action
<b>Evergreen</b>	always green; used to describe plants that do not lose their leaves or needles seasonally but, rather, stay green year-round; examples include Douglas fir, coastal live oak, California bay, and coyote bush; the opposite of “deciduous”
<b>Exotic species</b>	a plant or animal species introduced into an area where it does not occur naturally; nonnative species
<b>Exposure</b>	situation with regard to sunlight or wind; aspect: a southern exposure. something exposed, as to view; an exposed surface: exposures of rock
<b>Fauna</b>	all the animal species that may occur in an area
<b>Fertile</b>	productive
<b>First order consumer</b>	an organism, usually an animal, that feeds on plants or other animals
<b>Flora</b>	the plants of a particular region or period



# Vocabulary

<b>Food pyramid</b>	a diagram that shows the relationship between producers and consumers in a food web
<b>Food web</b>	the multiple interrelationships between all species in an ecosystem or habitat
<b>Forest litter</b>	the nonliving materials which collect on the forest floor over time; this includes dead leaves, fallen plants or trees, dead animals, etc.
<b>Freshwater marsh</b>	a tract of low wetland, often treeless, dominated by herbaceous plants under the influence of fresh water
<b>Geologic factors</b>	soil and the rock from which it was derived
<b>Germinate</b>	the process where a dormant seed begins to grow, usually when seeds have contact with moisture
<b>Girth</b>	the measurement around something, also called the circumference
<b>Habitat</b>	the natural environment of an organism; place that is natural for the life and growth of an organism, “address”
<b>Habitat type</b>	a land or aquatic unit, consisting of an aggregation of habitats having equivalent structure, function, and responses to disturbance
<b>Herb</b>	nonwoody plants
<b>Herbaceous</b>	a plant whose stem is soft and green and shows little growth of wood; the term is used to distinguish such plants from woody plants
<b>Heroic species</b>	a species that captures our hearts and minds and focuses our attention on its survival for the freedom and wildness that it embodies
<b>Human disturbance</b>	damage to an area caused by human activity
<b>Hypothesis</b>	an educated guess or prediction of the outcome of an experiment
<b>Indicator plant</b>	a plant that indicates, by its presence in a given area, the existence of certain environmental conditions or habitats. For example, the coyote bush is an indicator of the coastal scrub habitat
<b>Indigenous</b>	originating in and characteristic of a particular region or country; native (as opposed to exotic) to the geographic location of a restoration site





<b>Integrity</b>	the wholeness, soundness, and health of a biotic community
<b>International Biosphere</b>	an area that has been recognized by the United Nations for its worldwide ecological significance
<b>Invasive species</b>	nonnative plants or animals that invade an area and threaten the health of native plants or animals by consuming all of the space and resources within the ecosystem
<b>Inventory</b>	a count or estimate of all the given species in a particular ecosystem
<b>Invertebrate</b>	pertaining to creatures without a backbone
<b>Key characteristics</b>	the most apparent qualities or attributes that help one distinguish specific parts of the natural world
<b>Keystone species</b>	a species that is critical to the survival of many others due to its role as a food source or a provider of habitat
<b>Larva</b>	the immature, wingless feeding stage of an insect that undergoes complete metamorphosis
<b>Mammal</b>	any vertebrate having the body more or less covered with hair, nourishing the young with milk from the mammary glands, and giving birth to live young
<b>Microclimate</b>	the climate of a small area within a region, the climate in this small area is different from the rest of the climate in the region
<b>Microorganism</b>	any organism too small to be viewed by the unaided eye, as bacteria, protozoa, and some fungi and algae
<b>Migratory species</b>	an animal that passes periodically from one region or climate to another, such as certain birds, fishes, and mammals
<b>Monitoring</b>	to keep track of species within an ecosystem for purposes of detecting long term trends and disturbances
<b>Monocultures</b>	a plant that solely grows in an area
<b>Mutualistic relationship</b>	two or more organisms living together in a mutually beneficial relationship
<b>National Park System</b>	areas of national significance, scenic beauty, or historic importance, preserved for the use and enjoyment of this and future generations



# Vocabulary

<b>National Park Service</b>	people who manage the National Park System
<b>National Seashore</b>	an area of seacoast set aside and preserved for the public good
<b>Niche</b>	the ecological role, position, or function of an organism in a community of plants and animals, “profession”
<b>Nitrogen fixing</b>	nitrogenous waste is “fixed” and released into the water as nitrogen, a basic food source for microorganisms
<b>Nitrogenous waste</b>	a waste containing nitrogen
<b>Nonnative species</b>	a species which is foreign or exotic to an ecosystem
<b>Organic debris</b>	debris consisting of plant or animal material
<b>Ornithologist</b>	a scientist who specializes in and studies birds
<b>Overstory or crown</b>	the uppermost layer of trees in a forest, forming the canopy shading young trees, hardwoods, brush, and other plants growing beneath (i.e., understory)
<b>Partnership</b>	Point Reyes National Seashore has a partnership with the United States Geologic Service Biological Resources Division. With them, we have documented mountain lions, black-tailed weasels, bobcats, raptors, and other notable wildlife by using trail cameras
<b>Perennial</b>	a plant which has a life cycle lasting more than two years; generally, plants die back seasonally and regenerate from surviving roots or stems the following year
<b>pH</b>	a measure that indicates the relative acidity or alkalinity of a substance; the pH scale ranges from 0 (most acid) to 14 (most alkaline), with 7 being neutral
<b>Pitch</b>	a thick, sticky substance usually from conifers; also known as sap
<b>Plant community</b>	the plant populations existing in a shared habitat or environment
<b>Population</b>	organisms of the same species that occur in a particular place at a given time; a population may contain several discrete breeding groups or stocks
<b>Predator</b>	any organism that exists by preying upon or hunting other organisms



# Vocabulary

<b>Prescribing controlled burns</b>	resource managers can use controlled fires to reduce fuels found in forests and grasslands
<b>Prey</b>	an organism that is hunted by another species for food
<b>Producer</b>	a species that harnesses the sun's energy through photosynthesis to grow
<b>Productive nutrients</b>	nutrients which are rich and strongly help to support the inhabitants of an ecosystem
<b>Raptor</b>	a bird of prey (hawk, eagle, kestrel, falcon, osprey, etc.)
<b>Rare or endangered species</b>	a species of animal or plant listed that is rare, threatened, or endangered
<b>Refuge</b>	an area set aside to protect plants and animals
<b>Regeneration</b>	a new generation that forms from a past generation; after a forest fire, the forest will regenerate once the seedlings begin to grow
<b>Reinvigorated</b>	brought back to life, rejuvenated; when a forest fire sweeps through a forest, the forest can be reinvigorated
<b>Reptile</b>	a cold-blooded vertebrate that hatches from an egg, breathes air, and has scales or armor
<b>Restoration</b>	returning something to its original state
<b>Ridge</b>	a long, narrow elevation of land; a chain of hills or mountains
<b>Riparian</b>	relating to or living on the bank of a river or other body of water
<b>Riparian habitat</b>	a lush area along a river or other body of water
<b>Riparian corridor</b>	an area usually comprised of a creek or stream and its associated vegetation
<b>Sapling</b>	a young tree
<b>Scat</b>	excrement of an animal
<b>Scavenger</b>	an animal that eats dead or decaying matter
<b>Second order consumer</b>	an organism, usually an animal, that feeds on other animals
<b>Seedling</b>	a young tree that is generally less than 3 feet high



# Vocabulary

<b>Sensitive species</b>	a species that is often the most vulnerable to changes in an ecosystem. They are usually good indicators of larger problems in the environment
<b>Shorebird</b>	birds that frequent seashores and feed on the sandy beaches and tidepools, waiting for the tides to move in and out, uncovering their food (fish, shellfish, etc.)
<b>Shrub</b>	a woody, perennial plant differing from a tree by its low stature and by generally producing several basal shoots instead of a single stem
<b>Slope</b>	the gradual rise or fall in elevation
<b>Soil</b>	the portion of the earth's surface consisting of disintegrated rock and humus
<b>Species</b>	the basic category of biological classification, composed of related individuals that resemble one another, are able to breed among themselves, but are not able to breed with members of another species
<b>Stewardship</b>	taking care of the environment by being involved; taking action and participating in clean ups, education programs, helping others become more aware, and making responsible choices
<b>Substrate</b>	the underlying geologic material of a soil
<b>Survey</b>	a detailed study of an area
<b>System</b>	a group of related natural objects and/or forces within a defined zone
<b>Terrain</b>	a tract of land, especially as considered with reference to its natural features
<b>Thermal</b>	a rising air current caused by heating from the underlying surface
<b>Threatened species</b>	any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
<b>Topography</b>	the physical features of a place; hills, valleys, cliffs and plains
<b>Topsoil</b>	the fertile upper part of the soil
<b>Track</b>	the footprint or other mark left by an animal, person, or vehicle



<b>Understory</b>	the shrubs and plants growing beneath the main canopy of a forest, usually shade tolerant
<b>Watershed</b>	the region or area drained by a river, stream, etc.
<b>Wildfire</b>	out of control fire
<b>Wildlife habitat</b>	an area that provides a water supply and vegetative habitat and food for wildlife



# Ocean Habitat Definitions



## Vocabulary

<b>Abyssal plain</b>	the floor of the deeper ocean, offshore beyond the continental shelf
<b>Adaptation</b>	an organism's adjustment to environmental conditions; these modifications make it more fit for survival
<b>Aggregation</b>	crowded into a dense cluster; usually used to describe groups of animals
<b>Algae</b>	simple one-celled or many-celled plants, capable of photosynthesis, usually aquatic
<b>Amphibian</b>	a cold-blooded vertebrate that has gilled larvae, which becomes an air-breathing adult; such as a tadpole that becomes a frog
<b>Amphipod</b>	any of numerous small, flat-bodied crustaceans of the group Amphipoda, including the beach fleas, sand hoppers, etc.
<b>Animal sign</b>	the evidence of an animal's presence, including scat, rubbings, tracks, and trails
<b>Annual precipitation</b>	the amount of rain, snow, hail, etc., that falls at a given place within a year, usually expressed in inches or centimeters of water
<b>Aquatic roots</b>	roots that develop on stems above the area where they would normally grow, due to long periods of high-water levels
<b>Bacteria</b>	single-celled organisms, spherical, spiral, or rod-shaped, appearing singly or in chains, various species of which are involved in fermentation, putrefaction, infectious diseases, or nitrogen fixation
<b>Bay</b>	a recess in the shore, or an inlet of the sea or lake between two capes or headlands, not as large as a gulf, but larger than a cove
<b>Benthos</b>	the bottom of a body of water, for example, an ocean or a sea
<b>Biological diversity or biodiversity</b>	the number of species in a given habitat



# Vocabulary

<b>Biologist</b>	a scientist who studies the science of life in all its forms, especially with reference to origin, growth, reproduction, structure, and behavior
<b>Biotic community</b>	an association of living organisms having mutual relationships among themselves and to their environment, and thus functioning, at least to some degree, as an ecological unit
<b>Botanist</b>	a scientist who studies the science of plants
<b>Bryozoan</b>	the moss animals
<b>Camouflage</b>	an organism with a physical appearance which blends into its environment
<b>Candidate species</b>	any species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that is being considered for listing as endangered or threatened by federal or state governments
<b>Carapace</b>	the shell of an animal, like a turtle or crab
<b>Carnivore</b>	term commonly applied to any animal whose diet consists wholly or largely of animal matter
<b>Carrying capacity</b>	the maximum population that can be sustained in a habitat over the long term; usually refers to a particular species, but can be applied to more than one
<b>Commensal relationship</b>	two or more organisms living in close association, in which one may derive some benefit, but neither harms the other
<b>Community</b>	an association of living organisms having mutual relationships among themselves and to their environment, and thus functioning, at least to some degree, as an ecological unit
<b>Competition</b>	struggling for the same resources
<b>Consumer</b>	a species that relies on other plants or animals for food
<b>Continental shelf</b>	the sea floor bordering the shoreline, on average about 30 miles wide, that then breaks off into the deeper water of the continental rise and the abyssal plain
<b>Cordell Bank National Marine Sanctuary</b>	a sanctuary 52 miles north of San Francisco that protects the productive fisheries of the Cordell Banks which is poised on the edge of the continental shelf
<b>Critical habitat</b>	a specific area of land occupied by an endangered species





<b>Cryptically colored</b>	having a shell or skin that blends in with the environment and therefore protects an animal from being seen by a predator
<b>Decomposer</b>	an organism, usually a bacterium or fungus, that breaks down the cells of dead plants and animals into simpler substances; these are sometimes called nature's recyclers
<b>Density</b>	the number of organisms or items per unit area or volume
<b>Detritus</b>	organic material formed from decomposing organisms
<b>Diatoms</b>	tiny, single-celled algae that form at the bottom of the food pyramid
<b>Distribution</b>	the arrangement of a species in a given environment
<b>Diversity</b>	the array of species present and their spatial distribution (i.e., biodiversity)
<b>Dominant plant</b>	a plant that is present in large numbers in an area or habitat and by its presence defines the habitat
<b>Ebb</b>	the flowing back of the tide as the water returns to the sea
<b>Ecosystem</b>	a system formed by the interaction of dynamic and interrelating complex plant and animal communities of organisms with their nonliving environment
<b>Ecosystem inventorying</b>	a count or estimate of all the given species in a particular ecosystem
<b>Ecosystem monitoring</b>	to keep track of species within an ecosystem for purposes of detecting long term trends and disturbances
<b>Endangered species</b>	any species which is in danger of extinction throughout all or a significant portion of its range
<b>Environment</b>	the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time
<b>Environmental factors</b>	the combined influence of wind, rainfall, temperature, and exposure
<b>Erosion</b>	the loss of soil or rock through wind, rain, or wave action



# Vocabulary

<b>Estuary</b>	inlet where ocean water mixes with fresh water
<b>Exclosure</b>	a large net and fence, built around the nests of the snowy plover (endangered bird) to keep predators away from adults and chicks
<b>Exotic species</b>	a plant or animal species introduced into an area where it does not occur naturally; foreign or nonnative species
<b>Exposure</b>	situation with regard to sunlight or wind
<b>Farallon Islands</b>	small jutting islands approximately thirty miles off the coast of San Francisco surrounded by a National Marine Sanctuary that protects the marine ecosystem
<b>Fauna</b>	all the animal species that may occur in an area
<b>Fish</b>	any of various cold-blooded, aquatic vertebrates, having gills, commonly fins, and typically an elongated body covered with scales
<b>Flora</b>	the plants of a particular region or period, listed by species and considered as a whole
<b>Flotsam</b>	material or refuse floating on water.
<b>Food chain</b>	a series of organisms linked together by their feeding habits
<b>Food pyramid</b>	a diagram that shows the relationship between producers and consumers in a food chain. It illustrates the concentration of energy from one level to the next
<b>Food web</b>	the multiple interrelationships between all species in an ecosystem or habitat
<b>Freshwater marsh</b>	a wetland dominated by herbaceous plants under the influence of fresh water
<b>Geologic factors</b>	soil and the rock from which it was derived and how they affect the plants that grow upon them
<b>Gulf of the Farallones National Marine Sanctuary</b>	north and west of San Francisco Bay, this 1,255 square mile sanctuary protects open ocean, wetlands, reefs, beaches and open water for its habitat value and its productivity as a fishery
<b>Gull</b>	a gray and white water bird. Any of numerous long-winged, web-toed, having usually white feathers with a gray back and wings





<b>Habitat</b>	the natural environment in which an organism lives; a place that is natural for the life and growth of an organism
<b>Habitat type</b>	a land or aquatic unit, consisting of an aggregation of habitats having equivalent structure, function, and responses to disturbance
<b>Haul-out</b>	the act of seals or sea lions hauling or lugging themselves out of the ocean and onto the shore for various reasons, including warming their body temperatures, giving birth, and molting
<b>Headland</b>	a high point of land or rock projecting into the sea or other water beyond the line of coast
<b>Heroic species</b>	a species that captures our hearts and our minds and focuses our attention on its survival because of the freedom and wildness that it embodies
<b>Human disturbance</b>	damage or disturbance to an area caused by human activity
<b>Hydroid</b>	the asexual stage of certain animals like anemones and jellyfish and a group of animals that grow into branching colonies by budding; these sometimes look more like plants than animals
<b>Hypothesis</b>	an educated guess or prediction of the outcome of an experiment
<b>Indicator species</b>	a plant or animal that indicates, by its presence in a given area, the existence of certain environmental conditions
<b>Indigenous</b>	originating in and characteristic of a particular region or country; native (as opposed to exotic) to the geographic location of a restoration site
<b>International Biosphere</b>	an area that has been recognized by the United Nations for its worldwide ecological significance. For example, the Golden Gate Biosphere Reserve to which Point Reyes National Seashore belongs
<b>Intertidal</b>	pertaining to the area that is above the low-water mark and below the high-water mark
<b>Invasive</b>	quickly spreading
<b>Invertebrate</b>	pertaining to creatures without a backbone
<b>Key characteristics</b>	the most apparent qualities or attributes that help one distinguish specific parts of the natural world



# Vocabulary

<b>Keystone species</b>	a species that is critical to the survival of many others due to its role as a food source or a provider of habitat
<b>Lagoon</b>	a shallow body of water completely or partially separated from the ocean by a reef, sand spit, sand dunes, or some other barrier
<b>Larva</b>	the immature, wingless feeding stage of an insect that undergoes complete metamorphosis; the young of any invertebrate animal
<b>Mammal</b>	any vertebrate having the body more or less covered with hair, nourishing the young with milk from the mammary glands, and, with the exception of the egg-laying monotremes (es. duck-billed platypus), giving birth to live young
<b>Marine algae</b>	nonflowering plants, commonly called "seaweed," that flourish in shallow coastal waters
<b>Marsh pan</b>	a small tidepool in a marsh, or pooled depression on tidal flats
<b>Microorganism</b>	any organism too small to be viewed by the unaided eye, as bacteria, protozoa, and some fungi and algae
<b>Migratory species</b>	an animal that passes periodically from one region or climate to another, such as certain birds, fishes, and mammals
<b>Mudflat</b>	a mud-covered, unvegetated, gently sloping tract of land, alternately covered and left bare by tidal waters
<b>Murre</b>	common name for a group of diving birds of the same family as the auk and the puffin; murres eat small fish and crustaceans and lay their hard-shelled, pear-shaped eggs on bare rock. Murres return to the same breeding sites year after year. Both male and female incubate the single egg laid per season
<b>Mutualistic relationship</b>	two or more organisms living together in a mutually beneficial relationship
<b>National Park Service</b>	people who manage the National Park System
<b>National Park System</b>	areas of national significance, scenic beauty, historic importance, preserved for the use and enjoyment of this and future generations
<b>National Seashore</b>	an area of seacoast set aside and preserved for the public good
<b>Native</b>	an organism indigenous to a particular region



<b>Nearshore waters</b>	the shallow ocean waters within about one mile of the shore
<b>Niche</b>	the ecological role, position, or function of an organism in a community of plants and animals
<b>Nitrogenous waste</b>	waste containing nitrogen
<b>Nonnative species</b>	a species that has been introduced from another place or country
<b>Nudibranch</b>	sea slug. a shellless, marine snail
<b>Nursery</b>	an area where new plants or animals are propagated
<b>Nutrients</b>	particles of decayed marine plants, and animals, minerals and molecules that have been brought to the surface by upwelling waters
<b>Oceanography</b>	the study of the plants, animals, impacts, physical properties, and technology of the ocean
<b>Organic debris</b>	debris consisting of plant or animal material
<b>Partnership</b>	an arrangement between two or more people or agencies that work together for a common goal
<b>Pelagic</b>	pertaining to the open seas or oceans, living or growing at or near the surface of the ocean, far from land, as certain organisms
<b>Perennial</b>	a plant which has a life cycle lasting more than two years; generally a plant dies back seasonally and regenerates from surviving roots or stems the following year
<b>pH</b>	a measure that indicates the relative acidity or alkalinity of a substance. The pH scale ranges from 0 (most acid) to 14 (most basic), with 7 being neutral
<b>Plankton</b>	microscopic plants and animals floating on the ocean's surface; the primary food source of many marine animals
<b>Plant community</b>	the plant populations existing in a shared habitat or environment
<b>Pod</b>	a group or school of seals, dolphins, porpoises, or whales
<b>Population</b>	the number of organisms of the same species that occur in a particular place at a given time
<b>Predator</b>	any organism that exists by preying upon or hunting other organisms
<b>Prey</b>	an organism that is hunted by another species for food



## Vocabulary

<b>Producer</b>	a species that harnesses the sun's energy through photosynthesis to grow
<b>Productive nutrients</b>	nutrients that aid in the growth of plants
<b>Rare or endangered species</b>	a species of animal or plant listed that is rare, threatened, or endangered
<b>Refuge</b>	an area set aside to protect plants and animals
<b>Restoration</b>	returning something to its original state
<b>Roe</b>	the mass of eggs or spawn of the female fish
<b>Salt marsh</b>	an area that is characterized by periodic flooding due to tidal changes
<b>Scat</b>	the excrement of an animal
<b>Scavenger</b>	an animal that eats dead or decaying matter
<b>Sea stack</b>	a tower of coastal rock detached from a cliff-lined shore by wave action and surrounded by water
<b>Sensitive species</b>	a species that is easily affected by disturbance
<b>Shorebird</b>	a bird that frequents seashores and feeds on the sandy beaches and tidepools, waiting for the tides to move in and out, uncovering its food (fish, shellfish, etc.)
<b>Soil</b>	the portion of the earth's surface consisting of disintegrated rock and humus
<b>Spawn</b>	the mass of eggs deposited by fishes, amphibians, mollusks, crustaceans, etc.
<b>Species</b>	the basic category of biological classification, composed of related individuals that resemble one another, are able to breed among themselves, but are not able to breed with members of another species
<b>Splash zone</b>	along rocky coasts, the highest elevational zone (habitat) influenced by tides
<b>Stewardship</b>	taking care of the environment by being involved; taking action and participating in clean ups and education programs, helping others become more aware, and making responsible choices
<b>Storm surge</b>	a change in wave activity due to storms offshore
<b>Stream</b>	a body of water flowing in a channel or watercourse, as a river, rivulet, or brook that supports fish or other aquatic life





<b>Survey</b>	a detailed study of an area
<b>Swash line</b>	the high-tide line on the beach, which is found by looking for wet seaweed, debris, and shells; the area a wave comes up and goes down as it washes the shore
<b>System</b>	a group of related natural objects and/or forces within a defined zone; a more general and less rigorous term than "ecosystem"
<b>Thermal</b>	a rising air current caused by heating from the underlying surface
<b>Threatened species</b>	any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
<b>Tidal</b>	a situation in which the water level periodically fluctuates due to the action of lunar (moon) and solar (sun) forces upon the rotating earth
<b>Tidal influence</b>	the exposure of intertidal land to periodic inundation of seawater twice daily due to the rising and falling of the tides
<b>Tidal regime</b>	the range of elevations in a wetland experiencing a specific pattern of tidal inundation
<b>Tidal slough</b>	a small, meandering inlet in a bay or estuary
<b>Tide table</b>	a guide that predicts the daily high and low tides of a given area
<b>Tunicate</b>	an animal, including the sea squirt and "salps", considered the most primitive ancestor of animals with backbones, which includes humans
<b>Upwelling</b>	the current that brings cold nutrient rich water from the deep ocean to the surface
<b>Wildlife habitat</b>	an area that provides a water supply and vegetative habitat and food for wildlife.
<b>Wrack line</b>	the line of debris left on the beach by changing tides
<b>Zones, zonation</b>	differentiated areas of habitat characterized by a particular set of plants and animals, whose presence is determined by environmental conditions
<b>Zooplankton</b>	small (often microscopic) aquatic animals suspended or weakly swimming in water